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THE SUSTAINABLE DEVELOPMENT EFFECTS OF THE WTO TRIPs AGREEMENT: A FOCUS ON DEVELOPING COUNTRIES

-Working Paper-

September 1997

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The Sustainable Development Effects of the WTO TRIPs Agreement:

A Focus on Developing Countries

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Trade and Sustainable Development Program

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The Sustainable Development Effects of the WTO TRIPS Agreement: A Focus on Developing Countries

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The Sustainable Development Effects of the WTO TRIPS Agreement: A Focus on Developing Countries[1]

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1. Introduction

This paper examines the WTO Agreement on Trade-Related Aspects of Intellectual Property Rights, Including Trade in Counterfeit Goods (hereafter the TRIPS Agreement) and tries to analyze those areas in which the Agreement will impact, either positively or negatively, on sustainable development in developing countries such as Pakistan. Sustainable development, throughout the paper, will be taken to mean more than simply environmental protection (the implicit definition adopted by too many Northern voices), but will embrace the fundamentally interrelated concerns of environment, development and economy.

After brief introductions to the Agreement itself, and to the concept of intellectual property rights (IPRs), the paper turns to examining the possible effects (it is in most cases too early to give concrete assessments) of the Agreement, focussing on agriculture, manufacturing and copyrighted goods. It ends by proposing a number of policy actions which might contribute to sustainable development in the context of the Agreement.

It should be noted that this paper takes as a starting point the TRIPS Agreement as signed, accepting it for better or for worse as a done deal. While it contemplates a number of possible reforms, and suggests ways within the Agreement to interpret provisions to developing countries' advantage, it does not explore the option of outright renunciation of the Agreement, as advocated by some groups.

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[1] This paper was presented at the Second Annual Sustainable Development Conference, Islamabad, August 4 - 10, 1996.

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2. What is TRIPS?

The TRIPS Agreement is one element of the Uruguay Round results, the package which also created the World Trade Organization. As such, it came into force with the WTO on January 1, 1995.

It sets out the rules that Members of the WTO must follow in setting up systems to protect intellectual property rights within their borders specifying, for example, that such rights must be granted to foreign innovators in the same measure as they are to domestics (national treatment), and that nationals of no particular WTO Member country must be favoured over those of others (non-discrimination). The Agreement is unique among the WTO rules in that it is positively proscriptive. That is, all other WTO rules describe what countries may *not* do, while TRIPS describes what countries *must* do. In this sense, TRIPS is a manifestation of the evolution of the international trade regime toward non-tariff aspects of law which were formerly considered purely domestic policy.

The fact that TRIPS is part of the WTO means that any Member of the WTO must follow its strictures. Before the advent of the WTO, the contracting parties to the GATT were able to pick and choose among a number of "plurilateral" Agreements, deciding which was or was not in their interest. The WTO, however, brings virtually all the Agreements together under one umbrella, and membership in the Organization implies accession to all of them. Bringing all the Agreements together also means that there is scope for what is called "cross-retaliation". A country found to be contravening the TRIPS Agreement, for example, would be subject to retaliation in terms of its trade in goods, though goods are covered by a different Agreement. This makes Agreements such as TRIPS much more powerful than the old plurilateral Agreements, which could only penalize in terms of the type of trade they covered.

All WTO Members are required to have laws in place applying the TRIPS provisions as of one year from the entry into force of the WTO. Developing country Members, however, and Members in transition from centrally-planned economies, are entitled to a transition period of four additional years. Least developed country members, "in view of their special needs and requirements, their economic, financial and administrative constraints, and their need for flexibility to create a viable technological base",[2] are allowed an additional five years of transition, for a total of ten years. This paper will argue that the transition period be used strategically by countries such as Pakistan.

3. What Are Intellectual Property Rights?

Intellectual property rights are a legally enforceable but limited monopoly, granted by the state to an innovator. They specify a time period during which others may not copy

[2] TRIPS, Article 66.1.

the innovator's idea, allowing him or her to commercialize it, and recoup any investment on research and development. There is a centuries-old debate about the desirability of such rights. They trade off the welfare of the innovator, who deserves compensation for his or her efforts, against the welfare of society at large, which would benefit by unlimited access to the innovation. The public policy goal has always therefor been to find the right balance between these two elements.

Intellectual property has two characteristics in particular which lend it to such special legal protection. The first is that it tends to have high costs of development, and the second is that it tends to have low costs of reproduction. For example, it costs somewhere around US$200 million to bring a new drug onto the market, mostly in development expenditures.[3] Yet, after the drug has been developed it is a fairly simple and cheap matter to then manufacture it. Any good chemist could analyze the contents of a new drug and reproduce it -- a process known as reverse engineering. Computer software -- so easily copied -- is perhaps the best example of these characteristics.

The argument for IPR protection is that without protection from such acts, there would be less innovation. Nobody would be willing to stump up large amounts of money to develop new products if their inventions could be immediately copied and sold cheaply by others. The stronger the IPR protection, the more money can be recouped by the innovator, and thus the more innovation tends to occur. This is an important point, since innovative approaches to such sectors as agriculture, transportation, manufacturing, information technology, and energy are at the heart of sustainable development. At the same time, following the Brundtland definition's emphasis on the "overriding needs of the poor"[4], affordable access to the results of such innovation is also key to sustainable development. It is important to note that the incentive for innovation is a key justification for IPRs; we will see later that current IPR systems can in fact severely hamper the very innovation they are intended to spur.

There are three main types of IPRs: patents, copyrights and trademarks. Patents under the TRIPS Agreement cover "any inventions, whether products or processes, in all fields of technology, provided that they are new, involve an inventive step and are capable of industrial application."[5] This can include what we normally think of as inventions (e.g., a new can-opener, a new drug), as well as the processes used to create them. As we will see later, it might also include new varieties of plants, animals or microorganisms. Copyrights were originally intended to cover literary and artistic works, but now also cover computer software and other such intellectual creations. Trademarks are granted to names or labels which distinguish an article from others,

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[3] Correa, Carlos A. "Prospects and New Dimensions of International Transfer of Technology", *mimeo*, Buenos Aires, July 1993.

[4] World Commission on Environment and Development Our Comon Future, London: Oxford UNiversity Press, p. 42.

[5] TRIPS, Article 27.1. The terms "inventive step" and "capable of industrial application" can be read as synonymous with "non-obvious" and "useful" respectively -- terms often used in national patent legislation.

denoting a particular quality. This paper does not concern itself much with trademarks, but rather focusses on patents and copyrights, these being more relevant to sustainable development.

4. What Are the Possible Effects?

As noted above, it will not be easy to predict the effects of the TRIPS Agreement, since much of its interpretation is still uncertain, as is its relationship to other existing legal instruments, notably the Convention on Biological Diversity.[6] It is, however, possible to engage in informed speculation. The speculation that follows divides itself into three areas of effects: agriculture, manufacturing and information products.

4.1 Agriculture

The main areas of interest here are plant varieties, and genetically-modified organisms, whether plants, animals or microorganisms. There are two passages in TRIPS of direct relevance to these items:

> "Members may exclude from patentability inventions, the prevention within their territory of the commercial exploitation of which is necessary to protect *ordre public* or morality, including to protect human, animal or plant life or health or to avoid serious prejudice to the environment"
>
> "Members may also exclude from patentability ... plants and animals other than microorganisms, and essentially biological processes for the production of plants or animals other than non-biological and microbiological processes. However, Members shall provide for the protection of plant varieties either by patents or by an effective *sui generis* system or by any combination thereof."[7]

The first passage has yet to be definitively interpreted, and we will likely not know how powerful or weak this exception will be in practice until it is tested in a WTO Dispute Panel. Note the use of the word "necessary", which might give pause to those familiar with the restrictive way in which this word has been interpreted in other areas of exception to GATT law.[8]

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[6] For a good overview of the tensions between TRIPS and CBD, see Cameron, James and Zen Makuch. "The UN Biodiversity Convention and the WTO TRIPS Agreement: Recommendations to avoid conflict and promote sustainable development", Gland: WWF – World Wide Fund for Nature, 1995.

[7] TRIPS, Article 27.2; Article 27.3 (b).

[8] Article XX(b) of the GATT provides for an exception to GATT rules for certain measures "necessary" to protect human, plant or animal health. Several dispute panels have interpreted this to mean that the measures in question must be the least trade-restrictive alternative available to regulators. For a discussion, see Steve Charnovitz (1991), "Exploring the Environmental Exceptions in GATT Article XX", *Journal of World Trade*, Vol. 25 No. 5, October 1991, pp 37 - 56..

The second allows countries to refuse to grant patents to plants or animals. They must, however, allow patents on microorganisms. If they exclude plants from patentability, they must then either protect them by a *sui generis* system – a patent specifically designed for a certain type of intellectual property – or a combination of the two systems. An international *sui generis* system already exists for plant varieties – the plant breeders' rights specified by the Union for the Protection of New Plant Varieties (UPOV), discussed below – and the Uruguay Round negotiators were clearly thinking of it when they drafted this text. By not mentioning UPOV specifically in the TRIPS text, though, they intentionally left the door open for the creation of customized national systems.

Given the TRIPS provisions, and the exceptions noted above, what are the likely effects on local agriculture? They fall into four categories: industry concentration, biodiversity; innovation; and the various impacts of the two UPOV Acts. Each are examined in turn below.

4.1.1 Industry Concentration:

Strengthened IPRs will probably increase concentration in the seed industry, which produces new varieties of plants. Indeed, they have already done so.

> "A decade after the passage of the US Plant Variety Protection Act of 1970, five companies – all with less than 10 years' work in plant breeding – controlled almost one third of the issued rights for American agricultural varieties."[9]

Concentration arises because IPRs allow for a financial return to research and development investments. This stimulates investment in a sector which is, to some degree, characterized by increasing returns to scale. Those that were capable of very large investments eventually began to buy out smaller firms to consolidate their market positions. Stronger IPRs, in the form of the TRIPS Agreement, will intensify this effect internationally.

One of the first results is likely to be higher prices for IP-based products such as seeds. The less competition a given firm has, the more control it is able to exercise over its prices.

4.1.2. Biodiversity:

There are two distinct links between strengthened IPRs under the TRIPS Agreement and increased loss of biodiversity. The first, dealing with diversity of cultivated crops,

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[9] Zamora, Oscar B. "Proprietorship of Knowledge in Agriculture and Food Under GATT", in Moran, Antonio G., (ed.) IPR Sourcebook Philippines. Manila: University of the Philippines Los Baños College of Agriculture/Management and Organizational Development for Empowerment. 1994, p. 32.

is not particularly direct. Rather, strengthened IPRs are one of many factors helping to erode this precious resource.

A brief review of the value of such biodiversity may be in order. The type we are concerned with here is the diversity of crops cultivated by farmers, primarily in developing countries, where traditional methods of selection over generations of stewardship have resulted in tens of thousands of locally-adapted varieties of staple crops such as rice and maize. This diversity is primarily of value to the agricultural sector itself. Wild germplasm – genetic material from these so-called "land races" – is regularly used to infuse commercial varieties with desired characteristics such as resistance to new diseases and pests, saving billions of dollars worth of crops, and helping ensure food security. One international group of experts put it thus:

> "The agricultural research community cannot guarantee the survival of any crop, in any country, if the breeding options for that crop are curtailed through the non-availability of cultivated or so-called wild germplasm."[10]

The diversity of cultivated species is rapidly shrinking, as farmers switch from traditional varieties to new high-yielding strains developed by professional breeders. The Green Revolution first set these wheels in motion, delivering farmers new varieties with promises of better yields and better resistance to pests and disease. While this promise was in many respects unfulfilled, the damage to diversity was done, as farmers turned away from traditional varieties *en masse* and adopted modern strains.[11] By providing incentives to breeders to develop the new high-yield varieties, strengthened IPRs certainly contribute to this decline, but many other factors are also at work. National governments often push adoption of the new varieties, through extension programmes, subsidies to the necessary fertilizer and water inputs, and by refusing to supply credit to those who still cultivate land races. As well, those farmers targetting international export markets are expected to grow commercial varieties. Given these dynamic factors, and the fact that diversity of cultivated species was in rapid decline before even the beginning of the Uruguay Round negotiations, it is difficult to say just how great a contribution strengthened IPRs will make to the process.

Perhaps the most important effect TRIPS will have on diversity of cultivated crops arises not out of what it will do, but out of what it will *not* do. While varieties resulting from formal innovation, carried out by professional researchers, will be protected under TRIPS, by most interpretations there will be no protection for the varieties

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[10] The Crucible Group. People, Plants and Patents: The Impact of Intellectual Property on Biodiversity, Conservation, Trade and Rural Society. Ottawa: International Development Research Centre, 1994, p. 4.
[11] See, *inter alia*, Fowler, C. and Pat Mooney. The Threatened Gene: Food, Politics and the Loss of Genetic Diversity. Cambridge: The Lutterworth Press, 1990.

produced by informal innovation – by farmers selecting for desired characteristics generation after generation. This is the issue of farmers' rights vs. breeders' rights.

Breeders' rights are enshrined in and defined by the UPOV Convention, discussed above as a *sui generis* system of patents for plant varieties, and the one likely to be adopted by a number of countries in fulfilling their TRIPS commitments. Remember that TRIPS specifies that plant varieties must be protected either by a system of patents or by an effective *sui generis* system, or some mixture of the two. Breeders' rights as defined in UPOV are discussed in detail below, but they essentially ensure that the breeder of a plant variety has strong protection for his or her intellectual property, and is able to commercially exploit it.

The key question is, though, what constitutes protectable innovation? UPOV does not recognize or protect the products of informal innovation – of generations of careful monitoring and scientific selection for desired characteristics carried out by traditional farmers. As noted above, such informal innovation has resulted in a wide diversity of varieties of great value to commercial breeders, and using those varieties they regularly produce improved varieties which *are* protected by UPOV. But UPOV does not protect the land races produced by informal innovation, for several reasons. First, it does not recognize such varieties as innovative -- they already exist, and therefore, the reasoning goes, they are not novel. Second, a requirement of the UPOV system, as for most patent systems, is that the innovation be reproducible. In this context this means that plant varieties must be stable and homogeneous – that a protected seed must be able to consistently produce the same plant variety. This cannot be guaranteed with land races, which naturally produce mutations in a way that the products of formal innovation do not.[12]

This leaves something of an unbalanced system of protection, to the detriment of traditional farmers. To address this difficulty, many have called for protection in the form of farmers' rights – IPRs specifically devoted to protecting the products of informal innovation.[13] Farmers' rights are endorsed by the FAO's 1983 International Undertaking on Plant Genetic Resources[14], but are strongly opposed by multinational seed firms and the countries in which they are based.

The result is that there is no existing IP protection for land races. This has two effects. The first is that there are low financial incentives to conserve those races – thus the rush to switch to improved varieties by many traditional farmers, and the threat to diversity of cultivated crops. The second is that there has been a steady and substantial transfer of resources from South to North as the valuable products of informal innovation have been appropriated cost-free. The fact that the commercial varieties to whose

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[12] Many criticize the PBRs for this criteria alone, arguing that it promotes the antithesis of genetic diversity.

[13] See, for example, the "NGO Resolution on Farmers' Rights", Leipzig, June 16, 1996

[14] FAO Resolution 8/83, not adopted by consensus.

improvement they have contributed are then sold back to Southern farmers at prices designed to cover the considerable expense of formal innovation in the North highlights the nonsense of this situation. In terms of sustainable development at the local level, such South-North transfers are a negative force.

The second type of linkage between strengthened IPRs under TRIPS and biodiversity concerns not just cultivated crops, but diversity of all types of flora and fauna. The linkage here comes about in the context of patents for genetically modified plants, animals or microorganisms.[15]

Modern techniques of genetic manipulation allow scientists to insert desired but foreign genes into an organism, creating in effect a new life form. The U.S. company Upjohn, for example, added two coat protein genes to the yellow crookneck squash which confer resistance to two viruses which normally plague the crop, and patented the resulting new variety. Note that it is possible to splice genes from anything to anything: from animal to plant, or plant to microorganism. A widely-used bit of engineering involves taking genes from a soil microbe long prized for its insecticidal properties – *Bacillus thuringiensis* (Bt) – and inserting them into plant varieties to confer resistance. Some 2 million acres of Bt cotton have now been planted in the Southern U.S.

The release of such new life forms into the environment, whether they be plant, animal or microorganisms, raises concerns of a unique type. Genetically-modified organisms (GMOs) are able to perform the "3 Ms" – raising them in some people's minds to a higher level of concern than most other types of environmental problems. The 3 Ms are:[16]

- **Multiply**: Organisms, by their nature, can and do reproduce. If science produces a non-living product which turns out to have undesirable side-effects, it can be recalled. There is no way to recall a microorganism once it has been released into the environment, and plants and animals also tend to go forth and multiply, even against the wishes of their developers. The "killer bees" now plaguing the Western Hemisphere are one such mistake (though not the result of genetic modification). One of the key threats to biodiversity is the possibility that the GMO will negatively affect existing species, as introduced species have done in other contexts[17],

- **Mutate**: Even where a given GMO has no undesirable side-effects, we cannot be sure it will remain harmless. Organisms are subject to mutation, and the test

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[15] Recall that countries are not obliged to allow patents for animals. Also, while the discussion will talk only about patents, recall that plants may be covered either by patents of by a *sui generis* system, or some combination of the two.

[16] Adapted from the U.S. Biotechnology Working Group's "Briefing #2: The Realities of Risk Assessment", BSWG, Aarhus, Denmark.

[17] Examples of such "biological pollution" abound: zebra mussels, starlings and Purple Loosestrife in North America, rabbits in Australia, and so on.

conditions of a laboratory cannot simulate the environmental pressures which might give rise to mutation in the real world, nor predict the qualities of the organisms which might result.

- **Migrate:** Genes may migrate to other organisms closely related to the GMO via pollination or sexual reproduction. The worry, particularly for plants, is that the resulting new variety may choke out wild varieties or cultivated relatives, or have other undesirable characteristics.

The patenting of life forms is highly controversial for a number of reasons, including a moral objection to what is seen as manipulation of and ownership of life itself. Similarly, there are specific objections to patenting and manipulation of human genes in the absence of any moral guidelines for their commercial application. Such controversy is the reason the final TRIPS Agreement allows exceptions to patenting for plants and animals. But the threats to biodiversity are certainly compelling arguments for caution in the use of this type of biotechnology, particularly if we follow the strictures of the Precautionary Principle -- a fundamental element of sustainable development. It may be that these threats will be addressed in the Biosafety Protocol to the Convention on Biological Diversity, currently under negotiation. In the meantime, the TRIPS Agreement, by allowing countries the option to patent life forms, contributes to the risks – risks which do not respect national boundaries.

Another risk resulting from such patenting, but unrelated to biodiversity, is the effect GMOs will have on their predators. When Bt is used as a sprayed pesticide, for example, it is only present for a short time, offering only limited pressures on pests to develop resistance. Crops such as Bt cotton, on the other hand, will greatly increase such pressures, and some scientists estimate resistance will develop as a result in as little as 3 - 5 years.[18] This is problematic enough, but to compound the misery it will deprive farmers of one of the most popular tools of ecological pest control – the spraying of Bt.

4.1.3. The Effects of the Two UPOVs

Some of the effects of UPOV's plant breeders' rights were discussed above. A number of other local effects might be felt, depending on which Act of UPOV (if either) a country adopts. Those countries that signed before January 1st, 1996 had the option of signing the 1978 Act or the stronger 1991 version, but those which accede thereafter must adopt the later version. There are four essential differences which distinguish their effects:

1. **Scope of protection.** Under UPOV 1978, commercial use of reproductive materials of the protected variety is not allowed. In other words, a farmer could not purchase a

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[18] U.S. Biotechnology Working Group "Briefing #5: Bt Crops: A Case Study in Unintended Consequences of GMO Release", BSWG, Aarhus, Denmark.

protected variety, and grow seed from it for subsequent sale, since it could be used to reproduce the protected variety. UPOV 1991 offers the same protection, but in some cases takes it further, to the *products* of the protected variety. According to this restriction, if permission has not been properly obtained for the growing of a protected variety, the products of the crop (e.g., fruit from protected tree varieties) are also accorded IP protection.

2. Duration of protection. UPOV 1978 provides for a minimum of 15 years of protection, while UPOV 1991 extends this to 20 years.

3. Farmers' privilege. Farmers' privilege refers to the right of farmers using a protected variety to retain the seed from their crop for reuse, without paying royalties again to the breeder – a burden which would be particularly difficult for poor farmers. UPOV 1978 allows for farmers' privilege, while UPOV 1991 leaves it at the discretion of the national government.

4. Breeders' exemption. Breeders' exemption refers to the practice of allowing breeders free access to protected varieties for research purposes – a measure devoted to fostering increased innovation. UPOV 1978 allows for such an exemption. UPOV 1991 allows only a limited application of this exemption. If the resulting improved variety is deemed to be "essentially derived" from the original protected variety (i.e., sufficiently genetically similar) then, while the breeder of the new variety may be granted IPRs, IPRs over the new variety are also granted to the breeder of the original variety. It is not yet clear how "essentially derived" will be defined in practice.

This last element of UPOV 1991 might be thought to benefit traditional farmers, since a number of improved commercial varieties might be deemed to be essentially derived from land races. However, since there is no protection for such land races in the first place under UPOV, this potential protection for varieties derived from them is not available either.

4.1.4. Innovation:

It was noted above that one of the key rationales for IPR systems was that they foster innovation. Certainly stronger IPRs do create greater incentives for investments in research and development, which will probably result in better-yielding varieties. This, of course, would greatly benefit developing country farmers.

Unfortunately, most of this research will be done by firms in the North, due to the highly skewed distribution of research world wide between North and South. Some 95% of the world's patents are held in the North, and in information technology it is estimated that 90 - 95% of the world's research goes on in highly industrialized countries.[19]

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[19] Versola, Roberto. "IPRs and the Information Sector", in Moran, Antionio G, *op. cit.*, p. 17.

The result will be that many of the products of that research may not be ideal for Southern conditions; large multinational plant breeders do not regard the South as a significant enough market to gear research toward varieties appropriate to the various regions. This blunts some of the sustainable development effect that would have been created by increased research. In fact, some types of research in the North may even be undesirable for the South. For example, scientists have developed enzyme techniques for the artificial production of such Southern exports as vanilla, sugar and cocoa. It is to be expected that innovation done by Northern scientists will be in the interests of Northern producers.

Ironically, the system of IPRs enshrined in TRIPS, designed to foster innovation, may in some ways *obstruct* research and development. Traditionally, innovation has been based on existing varieties, which scientists used as the basis for improvements. This model is being eroded in three ways. The first is the limits imposed under the UPOV 1991 on the breeders' exemption (the rights of breeders to freely use protected varieties in their research, and to claim ownership over the results). As noted above, where the product of innovation is deemed to be "essentially derived" from the original variety, it can be protected, but the breeder of the original variety also claims rights on the new product. This is good in that it discourages breeding for cosmetic variations designed to circumvent IP laws. But it is bad in that it is as yet unclear how restrictively regulators will interpret "essentially derived". This creates a climate of uncertainty which bogs down both legitimate and pernicious research efforts.

The second threat to innovation comes from patenting of plant varieties. Under the patent system, there is no breeders' exemption of any type, and researchers will have to pay for access to patented materials used in their research, if they are allowed to access it at all. Many firms engage in what is known as "patent stacking" -- taking out many patents for different aspects of a single innovation, thus forcing several royalty applications and payments. This is particularly worrisome for publicly-funded research institutes, which are everywhere facing budget difficulties. The U.S., home to a large number of commercial plant breeding multinationals, uses a patent system for plant varieties instead of the UPOV plant breeders' rights.

Perhaps the most serious threat to innovation comes from trends in patent applications in the U.S., which seem to allow for patenting based on plant characteristics, rather than on the genes that produced those characteristics. For example, Agrigenetics in 1986 and 1988 secured patents from the U.S. Patent Office granting it monopoly rights over sunflower seed with high oleic acid content.[20] Such a broadly defined issuance effectively kills any further research into improved ways of producing sunflower seeds with this characteristic. Even more alarming is a 1992 U.S. patent issued to a subsidiary of W.R. Grace Inc. for genetically engineered cotton. A broader, more damaging definition of protectable intellectual property is harder to imagine, particularly given

[20] U.S. Patent Nos. 4,627,192 and 4,743,402.

the importance of cotton to economies such as Pakistan's. In 1994, India took the unprecedented step of rescinding this patent claim to protect the public good. The Director-General of the International Plant Genetic Resources Institute warned that:

> "The granting of patents covering all genetically engineered varieties of a species, irrespective of the genes concerned or how they were transformed, puts in the hands of a single inventor the possibility to control what we grow on our farms and in our gardens. At the stroke of a pen the research of countless farmers and scientists has potentially been negated in a single, legal act of highjack."[21]

Such patents will clearly slow the pace of research, and may be deliberately meant to do so. They will certainly tax the financial means of public sector researchers. Many analysts see a looming crisis in the patent system, based on the internal tensions expressed in such undesirable trends.[22]

4.2 Manufacturing:

Manufactured products, or products of industry, are for the most part covered by patent law. (The special case of copyrights is covered in the next section.) The main sustainable development effects to be felt in this sector as a result of TRIPS are:

1. Impacts on technology transfer
2. Impacts on prices of goods
3. Impacts on innovative development of technology, especially environmentally sound technologies

These will be examined below, in the context of impacts on pharmaceuticals, technology transfer and innovation.

4.2.1. Pharmaceuticals

Pre-TRIPS patent protection for pharmaceuticals was normally anywhere from 16 - 20 years, depending on the country. Some countries, such as India, provide much less, in an attempt to foster a healthy domestic industry in generic manufacturing of drugs. As well, many developing countries provide only process patents, meaning again that a strong domestic industry arises, built on imitation (imitating firms typically vary the process used to create a drug in a trivial way, and are thereby able to circumvent patent protection).

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[21] Rural Advancement Fund International. "Species Patent on Transgenic Soybeans Granted to Transnational Chemical Giant - W.R. Grace: Patents on other Majore Transgenic Crops Pending." RAFI Comunique, March/April 1994.

[22] See, for example, The Crucible Group, *op. cit.*

With the advent of TRIPS, protection must extend to 20 years from the date of filing, and must be based on both process and product. TRIPS also specifies an end to the practice of requiring the patent holder to work the patent in the country itself, as per the WTO principle of national treatment:

> "patents shall be available and patent rights enjoyable without discrimination as to the place of invention, the field of technology *and whether products are imported or locally produced.*"[23] (emphasis added)

The overall effect, then, of the TRIPS Agreement, is a much-strengthened patent system. The result for countries with weaker systems will be a significant decline in the generic manufacturing industry, and a significant increase in prices of protected drugs. To illustrate the magnitudes of the price increases, one need only look at the price differences which prevailed in a pre-TRIPS world between those countries with strong and weak protection of IPRs for pharmaceuticals. In India, where protection is weak, the drugs Ranitinidine (Zantac) and Diclofenac Sodium (Voveran) sell for 57 and 68 times less, respectively, than they do in the United States, which has a strong system.[24] The British National Health Service was, until recently, paying 40 times more for patented products used in the manufacture of Librium and Valium than their going price in Italy, which did not allow for pharmaceutical patenting.[25] These differences, of course, probably reflect a mixture of both the high costs of research and development, and the rents accruing to monopoly suppliers.

Price increase is a matter of concern for developing countries, whose poor may not be able to afford protected drugs. For most basic drugs available in developing countries, the patents have expired in any case. But the concern is that new drugs, such as AZT -- used in treating HIV and AIDS victims -- will not be available at an affordable price. In parts of Asia and Africa, where AIDS is reaching epidemic proportions, this is a concern.

The lack of farmers' rights affects pharmaceuticals in much the same way it does agriculture. The issue here is not so much what TRIPS does, but what it does *not* do. Traditional societies rely on a large number of plant remedies, knowledge of the use of which has been passed down from generation to generation. Such knowledge by some definitions is intellectual property, and quite valuable. In their search for new drugs, the pharmaceutical industry relies heavily on germplasm from such plants to provide new candidates for screening, and "bio-prospecting" from traditional societies is currently proceeding apace. More than 7,000 compounds in the Western pharmacopoeia derive from plants in developing countries. But, while such products

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[23] TRIPS, Article 27.1.

[24] Parthasarathi, Ashok. "The TRIPS Patent Regime: A Trip Up for Developing Countries?" paper presented at SDPI Second Annual Sustainable Development Cnference, Islamabad, August 4 - 9, 1996.

[25] Zamora, Oscar. *op. cit.*

of formal innovation are protectable under TRIPS patent provisions, the products of traditional knowledge are not.

This gives rise to some ludicrous situations. For example, the neem tree has been used in India for its medicinal and pesticide qualities for over 2,000 years. In the 1970s, a Mr. Robert Lawson "discovered" the neem on his visits to India, and worked out a process to derive and store the active ingredient. That process, and the product derived were then patented (the holder is now W.R. Grace Inc.), and are now for sale to, among others, the uncompensated citizens of India who first showed the neem tree to Mr. Lawson. It was noted above that this sort of unbalanced IPR protection amounts to a South-North transfer of significant proportions.

4.2.2. Technology Transfer

Technology transfer is seen by many to be an integral part of sustainable development -- particularly in the case of environmentally sound technologies (ESTs).[26] Agenda 21 has a chapter devoted to it, it is a central element in the Convention on Biological Diversity and the Multilateral Fund of the Montreal Protocol, and it will probably play a prominent role in the final version of the Framework Convention on Climate Change. In most fora, the call is for transfer of technology to occur from North to South, and to occur on concessional terms.

How will TRIPS affect this desired transfer of technology, which has at its heart the transfer of intellectual property, whether embedded in a piece of machinery, in a book, or in the persons of a management team? The three main vehicles for the transfer of technology are licensing, wholly owned subsidiaries and joint ventures. These are discussed each in turn below.

Licensing is the granting of permission, usually for a fee, to an applicant to use a piece of patented technology. It is done on a country-by-country basis. Countries such as India, anxious that their industrial sector should benefit from foreign technology, make heavy use of what is called compulsory licensing which, in prescribed circumstances, forces firms to license their technology to any who will pay a set fee. This discourages the patent holder from registering a patent in a country but not manufacturing the product there, and rather importing it from elsewhere.

Compulsory licensing is made difficult by the TRIPS Agreement:

> "Members may determine conditions on the licensing and assignment of trademarks, it being understood that the compulsory licensing of

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[26] For a definition of, and a discussion of the difficulties involved in the transfer of ESTs, see René van Berkel, "Capacity Building and Technology Transfer to Improve the Application of Environmentally Sound Technologies in the Transition towards Sustainable Development", paper presented at SDPI Second Annual Sustainable Development Cnference, Islamabad, August 4 - 9, 1996.

trademarks shall not be permitted and that the owner of a registered trademark shall have the right to assign his [sic] trademark with or without the transfer of the business to which the trademark belongs."[27]

There is, however, a set of circumstances, laid out in Article 31, under which a Member can in fact impose licensing without the permission of the patent holder, but they are fairly strict. Such licensing may take place if the practices of the patent holder are deemed to be anti-competitive, and early drafts of the Agreement gave examples of such behaviour, including demands that the licensee purchase or license other technologies or inputs as part of the deal (coercive package licensing), or requirements to transfer to the patent holder any improvements made on the technology. Unauthorized licensing may also take place for the purpose of public non-commercial use. In either case, authorization should proceed only after fulfilling a lengthy set of requirements including:

- the patent holder must be immediately notified
- granting of the license and the assessment of fees to be paid shall be appealable to a judicial or higher administrative body
- the product shall be primarily for the domestic market (this does not apply in the case of anti-competitive practices)
- authorization for such use shall be non-exclusive

There is thus some scope, albeit rather limited, for the application of compulsory licensing. The result of restricting this scope will be less potential on the part of governments to foster the creation of domestic industry based on a given foreign technology. Patent holders will probably increasingly export their goods to a country, rather than having to set up factories there for domestic production. This, of course, will not be universally true; in some cases firms may see strategic advantages to setting up local manufacturing to serve domestic or regional markets.

Some argue that the importance of licensing is declining in any case, as firms tend more and more to transfer technology through direct investment, either in joint ventures or in wholly-owned subsidiaries.[28] Modern communications technology has made the management and coordination of subsidiaries much easier. And for a number of reasons firms, particularly those manufacturing information-intensive goods, would increasingly rather invest than license. For one thing, many firms fear that licensing will help foster future competitors, as happened with Korea's computer and semi-conductor industry. As well, many information-based products become quickly obsolescent, and firms desiring a quick pay-back for their considerable expense in development may seek to set up shop quickly and exploit domestic markets.

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[27] TRIPS Article 21.

[28] See for example, Cooper, C. "Are Innovation Studies on Industrialized Economies Relevant to Technology Policy in Developing Countries?", Maastricht: UNU/INTECH, 1991, p. 14, and Correa, *op. cit.*

The result is that less and less cutting edge technology is in fact available for licensing, as patent holders also seek to become manufacturers and retailers, or at least partners in the process. This is worrisome for Southern countries seeking to develop domestic industries by the use of licensed technology transfer. This dynamic is less true for the type of "informal" technology transfer embodied in purchases of capital equipment, or the contracting of consultants. In such cases, the owner of the technology is not worried about his or her customers becoming potential competitors.

In such cases, however, the receiving country needs a good capacity to assimilate technology. Simply buying a piece of technology does not ensure gaining full benefits of its use, and repeated studies have shown that the most important factor in successful assimilation of transferred technology is the capacity of domestic industry for involvement. One such study, of 14 Thai firms, concluded that,

> "The degree of success ... depends on the ability, awareness and management skills possessed by the recipient enterprise, its investment in human resources through education, training and upgrading of skills, and an appropriate choice of technology supplier and channel or mechanism for transfer."[29]

In many cases, success is found to be related to the amount of research and development being carried out locally; a firm which has developed its own intellectual property is better able to assimilate that of others.[30] This suggests that countries anxious to develop their industrial sectors through technology transfer might focus on fostering domestic research and development, and good management and marketing practices, rather than exclusively on the vehicles of technology transfer such as compulsory licensing.

4.2.3 Innovation

It was noted above, in the discussion on agriculture, that the TRIPS Agreement had several elements which might contribute to a dampening of innovation. This, of course, applies to manufacturing as well. Several analysts have bemoaned what they see as a growing "scientific protectionism", whereby less and less is published about new innovations, and less information exchanged, as the potential returns to such information become larger.[31] Stronger IPRs, of course, contribute to this effect.

That said, stronger IPRs also contribute to increased efforts at innovation at the level of the individual firm. From a sustainable development standpoint, this is particularly

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29 Santikarn, Mingsarn. "Technological Aquisition in Thai Rice Milling and Related Capital Goods Industries", Geneva: ILO World Employment Programme Research Working Paper, March 1991.

30 See Enos, J.L. "Transfer of Technology", *Asian Pacific Economic Literature* 3: (1), March 1989.

31 See Carrea, Carlos M., *op. cit.*

important for technologies which are environmentally sound, such as innovations in solar power, pollution prevention in automobiles and so on. Most such innovation is likely to take place in Northern countries.

But not all will. It is often noted that countries in the early stages of industrial development fuel their fledgling sectors by having fairly loose laws to protect intellectual property, but that as they become leaders in innovation, they strengthen them.

> "As a young nation, the US wanted the freedom to borrow literature as well as technology from any quarter of the globe. ... Nineteenth century Americans were akin to a present-day under-developed nation which recognizes its dependence on the more commercially and technologically advanced, and desires the fruits of civilization in the cheapest and most convenient ways"[32]

The fact that the U.S., Japan and Germany once based their development on loose IPRs is much cited by present-day developing countries as a justification for their own loose regimes. But the lesson should also be turned on its head. It also demonstrates that strong intellectual property rights are an essential element in industrial development once a country has reached a certain level of capacity. Domestic innovation on any significant scale is seriously hampered by loose IPR laws, and perpetuating the imitation stage is as harmful as forever coddling infant industries. There are indications that China, for example, has now realized that it needs a strong system of IPRs for its own development purposes, and its current compliance with US demands for stronger IPRs is as much self-interested as it is obliging.

The bottom line is that the strengthening of IPRs embodied in the TRIPS Agreement will have varied effects on innovation in different countries. Those developing countries which have healthy domestic capacity for research and development, and strong management and marketing skills, may benefit from stronger IPR laws, in terms of increased domestic innovation. Those that do not may be hampered by TRIPS in their ability to develop such capacity through the necessary imitation stage of development.

4.3 Copyright Materials

Materials such as works of art or literature, or intellectual creations such as computer software or compiled databases, are covered under copyright law. The TRIPS Agreement requires Members to comply with the conditions of the 1971 Berne Agreement, the international standard for copyright protection. For most such works, the specified period of protection is 50 years.

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[32] Barnes, James. Authors, Pubishers and Politicians, quoted in Verzola, Roberto. "IPRs and the Information Sector" in Moran, Antonio G, (ed), *op. cit.*, p. 14.

The effects of TRIPS in this area for most developing countries will be a sharp rise in the price of such materials; few are parties to the Berne Agreement and unauthorized copying is commonplace. In terms of sustainable development this means more restricted access to software, databases, and other information-based tools used by industry and academia, which is worrying.

Of course, as with the case of patent strengthening, the impacts will vary depending on the degree of development of the domestic industry. Some countries, such as India, have a fairly high level of competence in software development and programming, and strengthened IPR systems may help foster a stronger domestic industry. It may also stimulate more foreign direct investment or joint ventures based on that domestic capacity, since foreign investors will feel secure that the intellectual property they bring with them will be somewhat protected.

The effects of strengthening IPR systems for such cultural products as music and motion pictures will again be price increases. Some would argue that the restrictions this would put on the flow of Hollywood products to developing countries would actually be beneficial in terms of sustainable development, and this author would be hard pressed to disagree.

5. Policy Recommendations

The United States, when negotiating trade policy, sets to work an enormous team of legal and industry experts who comb over the various drafts looking for or suggesting language which could be used to the advantage of their country's industries. They similarly look for such opportunities in Agreements which have already been signed, and by way of applying generous amounts of both intellect and imagination, produce interpretations which are beneficial to the U.S. economy.

This model has much to recommend it, if it is to be judged by its ultimate success, and the policy recommendations made here follow such a path, exploring every possible way in which the language of the TRIPS Agreement could be turned to the advantage of developing countries such as Pakistan. Straying somewhat from the U.S. model, which is quintessentially unilateral, it is here recommended that the measures suggested below be pursued in concert with as many like-minded countries as possible; in international trade policy, there is strength in numbers.

5.1 Agriculture:

Seven policy recommendations suggest themselves, following on the analysis presented above in the area of agriculture:

1. Developing countries should, when so required by TRIPS at the end of the transition period, exclude plants from patenting, and set up instead *sui generis* systems tailored to their own needs (i.e., they should *not* accede to UPOV). One of the aspects of this system should be the farmers' rights advocated by the FAO 1983 International Undertaking on Plant Genetic Resources, which protects land races and traditional medicinal plants as intellectual property. Another suggestion for the protection of such species, made by the Crucible Group of experts, is a system of so-called community intellectual property rights.[33] The *sui generis* system, if it does allow protection for genetically-modified plant varieties, should incorporate the highest standards of protection -- in line with the Precautionary Principle -- to ensure that release into the environment of genetically modified plants does not threaten biodiversity.

2. Such a patenting system should not be rushed into. On the contrary, it should be delayed as long as legally possible. Many analysts see, in the recent U.S. patents on plant characteristics, on entire species of transgenic plants, and on human genes, a looming crisis in the patent system. The changes that may result are difficult to predict, and in uncertain situations it is better to keep as many options open as possible.

3. An IP system protecting land races should be supplemented by a developing country government commitment to preserve these varieties, in recognition of the economic value they represent. This would involve, for example, changes to agricultural credit programs which are conditional on the growing of high-yielding modern varieties.

4. Those countries which may have already signed the UPOV Act of 1991 should exercise the option to grant farmers' privilege. That is, farmers should be granted the right to freely save seed for next year's crop, even if grown from protected varieties.

5. Developing countries should exercise the right under TRIPS to exclude animals from patent protection, given the dangers inherent in the release into the environment of GMOs. If adequate precautionary protection is enshrined in the Biosafety Protocol now being negotiated, they might consider allowing patent protection for genetically-modified animals, but might still want to exclude the patenting of human genes for reasons of *ordre public* or morality.

6. Similarly, developing countries should, until adequate measures of precaution have been specified internationally, exclude the patenting of microorganisms on the grounds of protection of the environment or of *ordre public*.

7. Developing countries should establish systems whereby public-spirited individuals or research institutes can make their innovations available to the public, while at the same time protecting them from those who would unscrupulously seek to patent

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[33] The Crucible Group. *op.cit.*, p. 67.

them in other countries. A suggestion made by the Crucible Group is a system for what they call "defensive publication".[34]

5.2 Manufacturing, and Copyrighted Goods

In the area of manufacturing and copyrighted goods, three suggestions present themselves:

1. In general, countries will need to assess their level of industrial development to determine whether strong patent protection is desirable or not. Those at higher levels of development may benefit from stronger patent law, which would foster increased domestic research and development.
2. If it is determined that a weak level of protection is desired for industrial patents, countries should take advantage of the opportunity offered by the TRIPS provisions on compulsory licensing. While TRIPS clearly sets out to make such licensing difficult, it does ultimately leave the door open. In fact, some analysts suggest that the TRIPS provisions for compulsory licensing to counter anti-competitive practices comes as close as we may ever get to fulfilling the promise of the unsuccessful efforts to create an International Code of Conduct on the Transfer of Technology.[35]
3. Governments should undertake to increase the domestic capacity to assimilate transferred technology, with the long-term goal of being ready to strengthen IPRs as a matter of national interest. Such a commitment might be expressed by measures to foster domestic research and development, training in negotiation and research for technology transfer, training in management and marketing skills, etc. Such programs should ideally find willing donors among the community of nations that has made commitments to facilitating technology transfer under such agreements as Agenda 21, the Convention on Biological Diversity, and the Montreal Protocol.

6. Conclusions

There are a number of aspects of the TRIPS Agreement that should be of concern to developing countries, such as Pakistan, which are committed to sustainable development. These have been highlighted in the paper, and some recommendations have been made for policies which will, to some degree, address those concerns. It should be stressed that there were also highlighted some ways in which stronger intellectual property rights could be beneficial in terms of promoting sustainable development, particularly in terms of stimulating domestic innovation, and these should be pursued.

The TRIPS Agreement is subject to review by the Members of the WTO as of 1999. At this time like-minded countries, both developing and developed, should approach the

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[34] *ibid*, p. 79.

[35] Correa, Carlos. *op. cit.*, p. 35.

review with clear and agreed priorities for change. The time between now and then should be used productively for discussion, the assessment and prioritization of concerns, and the building of the essential bridges of international consensus that will be necessary if the objective of sustainable development is to be achieved.